posits is the presence of stamps made of burnt clay with spiral devices upon them, which it is suggested may have served for producing coloured patterns on the human skin after the manner of tattooing. A few fragments of pottery are also decorated with spirals formed of white slip on a polished red ground, but bordered by lines painted in black. A favourite decoration consists of broad lines either straight or curved, and sometimes circular, distinguished by black edgings.

Spoons or ladles are fairly abundant, some having straight handles adorned with chevron and other patterns painted upon them. Human and animal figures in burnt clay occur, though rarely. Remains of beaver, bear, wolf, fox, lynx, wild cat, chamois, stag, and ox (possibly *primigenius*) have been found, and of domesticated animals, those of dog and pig.

Relics of a somewhat later age are also described, but the principal feature of the report is the pottery, which it will be of great interest to compare with that of a more southern area.

Dr. Moriz Hoernes, whose recent volume on "Diluvial Man in Central Europe" is well known, is author of the concluding paper in this volume. It relates to Neolithic dwelling-places near Troppau, in Austrian Silesia, and is illustrated by six admirable photographic plates and numerous cuts in the text. A remarkable stone hatchet has been found which was made out of the half of a perforated axe that had split along the perforation. Another hatchet shows the mark of the saw by means of which it was blocked out. The pottery is not remarkable, though there are among the specimens figured some stands for vessels not unlike those found by the MM. Siret in Spain. The objects found are, indeed, of a more common character than those from Transylvania. It is, however, of great importance that in a volume of reports such as that now summarised, all details of the discoveries on each spot should be carefully recorded, and the Prehistoric Commission of Austria may well look back with much satisfaction on the volume embodying the results of its labours. J. E.

NOTES.

The Secretary for Scotland received on Tuesday a deputation of Scottish scientific societies, who urged that the Royal Institution in Edinburgh should be exclusively devoted to scientific purposes (see p. 105).

We regret to see the announcement, in the *Daily Chronicle*, that Mr. J. S. Budgett, Trinity College, Cambridge, died at Cambridge on Tuesday of malarial fever. Mr. Budgett was Balfour student in biology, and only returned from the Niger recently.

The Clarke memorial medal of the Royal Society of New South Wales has been awarded to Mr. A. W. Howitt, of Melbourne.

The Food Test Commission, appointed by the United States Government, has reported that the use of salicylic acid in food is seriously injurious to health.

Prof. Vincent Rodella, of Rome, is reported to have met his death accidentally by inhaling the fumes of hydrocyanic acid in the course of some experimental work. He was only thirty years of age.

Messrs. Burroughs, Wellcome and Co. are making arrangements for a historical exhibition of rare and curious objects relating to medicine, chemistry, pharmacy, and the allied sciences, to be held in London in the course of a few months. The exhibition will be strictly professional and scientific in character, and is intended to illustrate the development of the art and science of healing. Cooperation is invited, and it is hoped that many objects of interest will be lent for exhibit. Mr. H. S. Wellcome, Snow Hill Buildings, E.C., will be glad to give particulars of the undertaking.

By the terms of Mr. Herbert Spencer's will, the trustees, on the completion of certain specified provisions in connection with his books, are directed to sell the whole of the copyrights and other property. The trustees are also directed to "give the sum realised in equal parts to the Geological Society, the Geographical Society, the Linnean Society, the Anthropological Institute, the Zoological Society, the Entomological Society, the Astronomical Society, the Mathematical Society, the Physical Society, the Chemical Society, the Royal Institution, and the British Association, or such of them as shall then be in existence, and shall accept the gift upon the condition in each case that the sum received shall, within five years from the date of payment, be spent by the governing body for the purchase or enlargement of premises, or for books or apparatus, or collections, or for furniture or repairs, or for equipment, or for travellers and donations of instruments of research, but in no way or degree for purposes of endowment."

An interesting paper on the electrical reconstruction of the South London tramways was read by Mr. A. Millar before the Institution of Civil Engineers on January 12. The paper describes in great detail the conduit system which has been employed. The lines which have been electrified are those known as the Tooting lines; the route length is just more than 8 miles, and the total length of single track 16¾ miles. The same system has been adopted for the Greenwich lines of the London County Council.

The council of the Institution of Civil Engineers has nominated the president, Sir William White, K.C.B., F.R.S., to fill the place of the late Sir Frederick Bramwell, Bart., as one of the representatives of that Institution on the Engineering Standards Committee.

We have received a copy of a pamphlet on the use of electricity in mines in Europe, by M. Émile Guarini, which has been translated into French from the *Engineering Magazine*. The pamphlet is well illustrated, and gives in detail descriptions of the principal applications that have been made of electricity to mining work. These are already numerous, but there is still much room for their further extension. We can recommend this pamphlet to those interested in the subject, whether as mining or as electrical engineers.

The completion of the Great Northern and City Railway marks another step in the progress of the provision of proper transport facilities in London. The new "tube" does not differ much from its predecessors in the general features of its construction and electrical equipment. It is, however, the largest of all in diameter, being large enough to accommodate, if necessary, the existing rolling stock of the Great Northern Railway. Special precautions have been taken in the construction of the tunnel to guard against the risk of fire and to lessen the chances of vibration. The railway will be open to general traffic in a few weeks. It has taken just four years to complete; an extension of the line from Moorgate Street to Lothbury is now in progress.

Dr. H. R. Mill has sent us a copy of a very handy pocket register which has been prepared by him for the personal use of rainfall observers. It contains full instructions for placing the rain-gauge, forms for recording the daily readings of one or several instruments, monthly summaries, and the extreme daily falls in each month. It also contains some useful memoranda connected with the subject, and, for convenience of comparison with other stations, the average monthly falls of several types, from the driest to the wettest localities. Space is also provided for recording the general conditions of weather, wind direction, &c. Suggestions for improvement are solicited; we do not think he has left much room for improvement, but we suggest that the Beaufort weather notation or the international weather symbols might be a useful addition to the work.

WE have received from the Meteorological Office a list of the meteorological observations received there from colonial stations in various parts of the world. During the year 1902 manuscript returns were received from sixty-two stations, more than half of which are situated in Africa. The amount of the information received varies considerably; at some stations complete registers have been kept, while at others only the daily rainfall has been observed. The list also contains a statement of the printed observations received either direct from the colonies and protectorates or which are included in books in the possession of the Office. It may not be generally known, although the fact is published in the annual reports issued by the Meteorological Council and in circulars issued from time to time, that this valuable information, both manuscript and printed, is available for reference free of charge by permission of the secretary.

IN his interesting and stimulating address on "A Scheme for Exploration in Asia Minor," recently given before the Society for the Promotion of Hellenic Studies, Prof. W. M. Ramsay suggested the formation of a summer school of exploration in Asia Minor. The scheme, briefly, was the conducting of parties of young men by an experienced leader to various regions of Asia Minor; a suitable town would be selected for the headquarters of a party, from which excursions could be made. All those who have done field work far removed from home find that there are elements of uncertainty in their notes which a very short inspection of the original ground, or a few minutes' conversation with a native, would dispel, but which have to remain doubtful owing to the difficulty or impossibility of returning to the place. Prof. Ramsay wisely proposes that the students should write up all their notes at the centre, and thus verification would be easy. There are many other branches of science which admit of similar developments. Field work is often undertaken in the long vacation, but it is frequently desultory; what we now require is the combined action of several universities for well planned field work in geology, geography, botany, zoology, and anthropology, including archæology and ethnology. Such practical work should be considered as part of the academic curriculum, and it is certain that these would become still more living subjects in our universities if the undergraduates felt that they were making original investigations in the field, while the students themselves would greatly benefit by this new departure.

IN the *Entomologist* for January the Hon. N. C. Rothschild describes four new species of fleas taken on Egyptian rodents. Others are described by the same writer in a recent issue of *Novitates Zoologicae*, one of which is named in honour of Mr. O. Thomas.

IN the report of the Bristol Museum and Library for 1903, the committee directs attention to a fine series of heads of large mammals from Somaliland, collected and presented by Major H. G. C. Swayne, R.E., the discoverer of *Bubalis swaynei*. A photograph of the group is included in the report.

THE *Journal of Conchology* for January contains three papers on the small fresh-water gastropods of the genus Paludestrina. In the first Messrs. Jackson and Taylor have notes on the habits of a species named from British specimens in 1891; in the second Mr. Tomlin records for the first time the continental *P. anatina* in Britain; while in the third Mr. Dean describes the relation of fishes to *P. jenkinsi*.

THE regeneration of lost parts in various invertebrates forms the main topic in vol. lxxv., part iii., of the *Zeitschrift für wissenschaftliche Zoologie*, Mr. P. Imanow contributing an article on this subject in connection with a species of worm, while Dr. E. Schultz contributes two instalments of the account of his investigations on reparation of injury in general. In a fourth article Dr. O. Römer discusses the histological structure of the shell of certain bivalves, more especially the pearl-oyster. The skin-nerves of Ammocœtes form the subject of an essay by Dr. G. Marenghi.

ACCORDING to the *Daily Telegraph*, whalebone has been recently sold in America for 2900*l.* per ton, while it is also asserted that 3000*l.* per ton has been paid for two and a quarter tons at Dundee, although there seems to be some degree of doubt attaching to the latter statement. Soon after the middle of last century, the price of this commodity was as low as 150*l.* per ton, but, according to the late Frank Buckland, it suddenly leapt up to 620*l.* with the introduction of the "crinoline" into ladies' costume, and it has apparently been on the rise ever since.

IN the January issue of the *Popular Science Monthly* Dr. F. A. Bather, of the British Museum, returns once more to his favourite subject—the functions of museums. After mentioning the chief functions of these institutions, the author gives some much needed advice to the curators of local museums as to the necessity of firmness in refusing unsuitable specimens—if they do not wish the establishments under their charge to degenerate into mere curiosity shops. Small local museums are also warned that investigation is not their province—they are for education and the general public needs alone. Further, in larger establishments the investigation, the instruction, and the exhibition series must be kept apart. In the author's opinion, where museums have, as a rule, gone wrong is in exhibiting too much to the public. The same journal also contains an admirably illustrated article by Prof. T. A. Jaggar, of Harvard University, who was present at the time of the eruption of Mont Pelée on July 9, 1902.

WE have been favoured by Captain Barrett-Hamilton with copies of two papers recently contributed by him to scientific journals. In the one (*Proceedings* Royal Irish Academy, xxiv., part iv.) he describes a new bank-vole (*Evotomys scomerensis*) from Skomer Island, off the coast of Pembroke, which differs from *E. glareolus* of the mainland by its superior size, its colour, and the structure of the skull. In the second (*Ann. Mag. Nat. Hist.*, series 7, xi., p. 390) he records the result of his own observations on the flight of the true flying-fishes (Exocœtus), which differs to some extent from those of other recent observers. Captain Hamilton, who is in this respect in full accord with the late Prof. Möbius, is of opinion that, at any rate in the genus named, the "wings" are never moved as organs of true flight. "They may vibrate or quiver under the action of air-currents or the shifting a little of their inclination by the fish; but the whole motive power is supplied by the powerful tail. The wings are a parachute to augment the action of this propeller. Their motions are in no way comparable to those of the wings of a bird."

THE January number of the *Journal of State Medicine* commences a new series, and the *Journal* has been enlarged and much improved in appearance and in printing. It includes articles and papers by Prof. Hueppe on tuberculosis, Mr. Lloyd on the milk supply of large towns, Dr. Coles on acid-fast bacteria, Prof. Smith and Dr. Sommerville on the standardisation of disinfectants, and Prof. Hewlett on ankylostomiasis, with a translation of Prof. Behring's article on tuberculosis, together with chemical and legal notes, reviews, &c.

IN the current number of *Climate* the work that has been done by the London and Liverpool Schools of Tropical Medicine is reviewed, and Sir Patrick Manson's address on the former is given *in extenso*. An extract from a despatch from Sir William MacGregor, the Governor of Lagos, suggests the introduction into the elementary schools in the tropics of the subjects of hygiene and sanitation. Sir William MacGregor has already taken the bold step of including sanitation with reading, writing, and arithmetic as compulsory subjects in the schools of the Lagos colony receiving Government grants. A description of the Livingstone College and some technical papers complete the list of articles appearing in this useful periodical.

IN a communication to the Paris Académie nationale de Médecine (December 8, 1903) Dr. J. A. Rivière gives an account of the results achieved by him in the treatment of inoperable malignant growths by physicotherapeutic means, *i.e.* by a combination of X-rays, static electric discharges, and discharges of high frequency, together with the administration of calomel and quinine internally to promote elimination. The effect of the treatment is to cause a diminution in the size of the growths, disappearance of enlarged glands and of œdema, abolition of pain, and healing of ulcers, together with an improvement in the general condition of the patients.

IN a report on the second outbreak of plague at Sydney in 1902 just published, Dr. Ashburton Thompson describes in detail the management of the epidemic, and discusses the mode of spread of the disease. Both in this and in the previous epidemics the disease seems to have been undoubtedly rat-borne, and it is of interest that an outbreak occurred among the animals in the Zoological Gardens. The mode of spread of the disease from infected rats to man has been a much debated question, Simond, Tidswell and others maintaining that the fleas serve as the intermediaries, while others, notably Galli-Valerio, deny this on the ground that the rat fleas do not bite man. Further observations have been made on this point by Dr. Frank Tidswell, microbiologist to the Sydney Board of Health. The species of flea infesting the rat (at Sydney) in order of frequency are:—*Pulex pallidus, Pulex fasciatus, Typhlopsylla musculi,* and *Pulex serraticeps*. Of 101 fleas obtained from man, 85 were *Pulex irritans* and 16 were *Pulex serraticeps*; from a wallaby, dogs and cats, numerous specimens of *Pulex serraticeps* were obtained; thus there is one species common to man, the rat, and other animals. The objection, therefore, that the "rat flea" does not bite man falls to the ground as regards one species, and Dr. Tidswell further states that he has repeatedly observed both *P. pallidus* and *P. fasciatus* bite man. Reviewing the evidence, therefore, Dr. Thompson is of opinion that Simond's hypothesis of "flea borne plague" best explains the phenomena of the epidemic of the disease as seen at Sydney.

THE report of the Botanical Exchange Club of the British Isles for 1902 is edited by Mr. Arthur Bennett. Mr. C. Bailey gives a list of some interesting plants which he found on the sandhills at St. Anne's, Lancashire, and figures *Ambrosia artemisiaefolia* and *Vicia villosa*. Mr. G. C. Druce has been able to reinstate another of Don's doubted records by finding the grass *Deyeuxia neglecta* in Caithness.

IN the *Proceedings* of the Boston Society of Natural History Mr. C. A. King describes certain stages in the life-history of Araiospora, a genus allied to the common plant parasite Pythium. The chief points of interest are the formation of a fertilisation tube, not by the antheridium, but by the oogonium, and the specialisation of a central mass of protoplasm in the oogonium in which the male and female nuclei meet. The author places the genus in the Peronosporeæ.

WE have received a copy of an address by Dr. Rudolf Blochmann on "Die drahtlose Telegraphie in ihrer Verwendung für nautische Zwecke" (Leipzig and Berlin: Teubner, 1903), given at the thirty-fourth annual meeting of the German Nautical Society at Berlin in February, 1903. It consists of a very general description of the methods used in wireless telegraphy and of the author's views as to the future in store for wireless methods. Stress is laid on the utility of such methods in the case of fogs at sea.

A TRANSLATION into French of Prof. T. Jeffery Parker's "Lessons in Elementary Biology," by Dr. A. Marie, has been published by M. C. Naud, of Paris.

THE third and concluding volume of Mr. C. Raymond Beazley's "Dawn of Modern Geography" will, it is hoped, be ready for publication early next year. It will be issued by the Oxford University Press, to which Mr. Murray has transferred the volumes already published. Dr. M. Aurel Stein has undertaken, with the official sanction of the Secretary of State for India, a complete account of the results of his researches in Chinese Turkestan. The book will be published by the Oxford University Press, probably in the spring of 1905.

THE "Year-book of New South Wales," compiled by the editor of the "Year-book of Australia" by authority of the Government of New South Wales for circulation by the Agent-General in London, contains much information of value about the colony. In addition to particulars concerning administrative, commercial, and other matters, the volume provides an interesting account of the geographical characteristics of the country, its water supplies, and its mineral products. In fact, the publication contains all the data necessary to enable a prospective emigrant to form a good idea of New South Wales.

THE current number of the *Quarterly Review* contains two articles on subjects of scientific interest. The first is on the metric system of weights and measures, and in it the writer examines exhaustively the arguments for the compulsory adoption of the metric system. He comes to the conclusion "that the stock arguments of the advocates of the metric system, based on the extent to which it prevails abroad and the disadvantage to British trade of our adherence to a different system, have very little justification when we consider our whole trade, import and export, with our colonies and with foreign countries." The "analysis of the conditions of our foreign trade," the article states, "leads us back to the ground that the advocates of the change would do well never to have quitted, viz. the comparative merits of the metric and imperial systems. . . . As regards all such important points as logical arrangement and symmetry, ease and swiftness of calculation, simple and direct connection among the fundamental units of length, weight, and volume, there can be no possible room for doubt as to the vast superiority of the metric system." The other article is by Mr. W. C. D. Whetham, and is entitled "Matter and Electricity." It gives a good and complete account of the scientific work of the last seven years, or so far as radiation and radio-activity are concerned. The researches of Becquerel, J. J. Thomson, Rutherford, the Curies, Crookes, Dewar, Ramsay, Soddy, and others are passed in review, and a clear idea is given of what, in the opinion of the best authorities, is the probable physical significance of the results obtained.

The December number of the *Agricultural Students' Gazette* (Cirencester) contains a lecture given at the college by the new honorary professor of forestry, Dr. W. Schlich, which is of special interest in view of the attention which forestry and education in forestry are receiving at present. By an appeal to figures, the professor showed that the demand for timber in this country increases steadily, and that our foreign supplies rest on an unsafe basis. The British forester has therefore a double incentive to mend his ways, for not only is there the prospect of an advance in prices, but he may, if he will, replace by home-grown timber part of the present imports. In discussing the question, "Will it pay?" Dr. Schlich had to confess that British forests supplied him with no satisfactory data, for none has been sufficiently long under scientific direction, but he was able to show what had been done by Saxony under conditions which are not very different from ours. The forests of that State, which occupy close on half a million acres, have been systematically worked by the Government for more than a century, and since 1817 records have been kept. In 1817 the produce was 61 cubic feet, in 1893 92 cubic feet of timber per acre; while the net return eighty years ago was 4*s.*, and in 1900 was 22*s.* 6*d.* per acre. After discussing the cost of production, the lecturer said he estimated that a purchaser who was content to accept 2½ per cent. for his money might pay for land for oak growing 9*l.* 10*s.*, for spruce 15*l.*, for ash 24*l.*, and for larch 34*l.* per acre. As oak requires a much better soil than spruce or larch, it is evident that the profits from growing timber will vary widely with the species grown. The above figures, however, do not take account of diseases, and these sometimes seriously affect profits. Larch, the most valuable of our trees, readily falls a prey to *Peziza Willkommii*, and so destructive has this parasite become of late years that Dr. Schlich fears it may make profitable larch cultivation impossible.

It appears from the work of the expedition under Colonel Spindler, which has lately explored the Gulf of Kara-bughaz, that this interesting appendix of the Caspian Sea has a great commercial value, its bottom being covered with immense layers of nearly pure Epsom salt (mirabilite). This large gulf, which covers 7080 square miles, and has only a depth of from 34 to 36 feet, is now separated from the Caspian Sea by two narrow sand peninsulas which are nearly joined at their ends, leaving only an 86 fathoms wide channel, through which the water of the Caspian continually rushes into the gulf, to be evaporated there, leaving its salts to be deposited at the bottom. From 18 to 33 cubic kilometres of water enter in this way the gulf every year, and under the rapid evaporation which goes on there (3·2 feet per year) the salinity of the water in the gulf attains as much as 16·3 per cent. Consequently, the bottom of the Kara-bughaz consists now to a great extent of gypsum or of Epsom salt, and it is calculated by the chemist of the expedition, A. Lebedintseff, that the deposits of pure Epsom salt must cover an area of about 1300 square miles, and have a thickness of 7 feet or more. Owing to the small depth of the gulf, this salt can easily be extracted by means of excavating machines.

The additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mrs. Hughes; a White-backed Piping Crow (*Gymnorhina leuconota*) from Australia, presented by Mr. H. Brack; a Ring-necked Parrakeet (*Palaeornis torquatus*) from India, presented by Mrs. Watts; three Yellow Baboons (*Papio cynocephalus*) from Africa, three Impeyan Pheasants (*Lophophorus impeyanus*) from the Himalayas, two Rufous Tinamous (*Rhynchotus rufescens*) from Brazil, two Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, deposited.

OUR ASTRONOMICAL COLUMN.

Intensity of Atmospheric Lines in the Solar Spectrum.—The results of an interesting research on the intensities of the atmospheric lines in the solar spectrum are published in No. 8, vol. xlviii., of the Harvard College Observatory *Annals*. The widths of various lines in the D, *a* and B regions were measured on the solar spectrum charts prepared by Higgs under various recorded atmospheric conditions and solar altitudes. The results thus obtained, after suitable reduction to standard conditions, were analysed, and in cases where a difference exceeding a fixed minimum was found to exist between the width of a line at "high" sun and its width at "low" sun, this line was attributed to absorption in our atmosphere. The lines thus determined as "atmospheric" were compared with those similarly designated by Rowland, and in a few cases in each region the decision of that observer, as to whether a line was truly solar or atmospheric, has been reversed.

Measurements of the widths of six atmospheric lines between λλ 5867·8 and 5905·5 were made on sixteen charts, and the results arranged in a table in which the charts were placed in order of the sun's altitude at the time each chart was drawn. According to the general result the lines should show an increase of width proportionate to the lengths of the paths of the rays through our atmosphere, this increase of width being probably due to the moisture present in the atmosphere. Some abnormal widths were, however, noted, and were found to agree, in effect, with Higgs's remarks as to the state of the atmosphere at the times the respective charts were made. From these results it is concluded that this method is probably the most accurate one known for determining the total amount of moisture, in the line of sight, in the earth's atmosphere.

Observations of Jupiter.—Some interesting results of observations of Jupiter during 1903 are published by Mr. Denning in No. 340 of the *Observatory*. Between May 26 and November 19 the planet was observed on eighty-four nights, 1200 transits of various markings being observed. It is proposed to continue the observations until the end of the present month, and then to publish the complete results. A few of the more important points in the observed phenomena may, however, be mentioned now.

During the six months completed at the end of November the rotation perod of the Great Red Spot became somewhat lengthened, the mean value being 9h. 55m. 41·7s., as compared with 9h. 55m. 39·0s. in 1902. The large south tropical spot, visible since the spring of 1901, is still easily seen, and has a rotation period of 9h. 55m. 19s. This spot